WHAT IS CLAIMED IS:

1. A method of forming an oxide layer, the method comprising:

providing a workpiece;

providing a fluid, the fluid having a temperature and a pressure;

increasing the temperature and the pressure of the fluid until the fluid reaches a supercritical or near-supercritical state;

providing at least one oxidizing agent;

combining the supercritical or near-supercritical state fluid with the at least one oxidizing agent to form a supercritical or near-supercritical state mixture; and

applying the supercritical or near-supercritical state mixture on the workpiece to form an oxide layer on the workpiece.

2. The method according to Claim 1, wherein the workpiece includes surface contaminations on a surface thereof, wherein the surface contaminations are removed simultaneously with the forming of the oxide layer.

3. The method according to Claim 1, wherein the fluid comprises H_2O or CO_2.

4. The method according to Claim 1, wherein increasing the temperature of the fluid comprises increasing the temperature of the fluid to a temperature of about 300 °C to about 750 °C.

5. The method according to Claim 1, wherein increasing the pressure of the fluid comprises increasing the pressure to a pressure of about 176 bar to about 440 bar.

6. The method according to Claim 1, wherein applying the supercritical or near-supercritical state mixture on the workpiece comprises a flow rate of about 0.1 liter per minute to about 25 liters per minute.

7. The method according to Claim 1, wherein providing the at least one oxidizing agent comprises providing O_2, O_3, H_2O_2, NO, N_2O, NO_2, N_2O_2, organic alcohol, organic acid, organic aldehyde or combinations thereof.

8. The method according to Claim 1, wherein providing the at least one oxidizing agent comprises providing NO, N_2O, NO_2, N_2O_2, or combinations thereof.

9. The method according to Claim 8, wherein forming the oxide layer comprises forming nitrogen doped oxide.

10. The method according to Claim 1, wherein the workpiece comprises a semiconductor material selected from the group consisting of Si, Ge, SiGe, GaAs, InAs, InP, Si/Si, Si/SiGe, and silicon-on-insulators.

11. The method according to Claim 1, wherein the workpiece includes a material layer formed thereon, wherein forming the oxide layer comprises forming the oxide layer over the material layer.

12. The method according to Claim 11, wherein forming the oxide layer comprises forming a capacitor dielectric layer over the material layer.

13. The method according to Claim 12, wherein the material layer comprises a bottom capacitor plate of a metal-insulator-metal (MIM) capacitor, further comprising forming a top capacitor plate over the capacitor dielectric layer.

14. The method according to Claim 1, wherein forming the oxide layer comprises forming a gate oxide layer.

15. The method according to Claim 14, further comprising:

depositing a gate contact layer over the gate oxide layer;

patterning the gate contact layer and gate oxide layer; and

doping portions of the workpiece to form source and drain regions in the workpiece, forming a transistor device comprising the source and drain regions, gate oxide layer and gate contact layer.

16. The method according to Claim 1, wherein forming the oxide layer comprises forming the oxide layer at a rate of about 5 Angstroms per minute or greater.

17. The method according to Claim 1, wherein forming the oxide layer comprises forming about 400 to about 800 nm of material.

18. A method of forming an oxide layer, the method comprising the steps of:

providing a workpiece; and

exposing the workpiece to a mixture of a supercritical state fluid or near-supercritical state fluid and at least one oxidizing agent, forming a layer of oxide on the workpiece.

19. The method according to Claim 18, wherein the supercritical state fluid or near-supercritical state fluid comprises H_2O or CO_2.

20. The method according to Claim 18, wherein the at least one oxidizing agent comprises O_2, O_3, H_2O_2, NO, N_2O, NO_2, N_2O_2, organic alcohol, organic acid, organic aldehyde or combinations thereof.

21. The method according to Claim 18, wherein the temperature of the supercritical state fluid or near-supercritical state fluid is about 300°C to about 750°C, and wherein the pressure of the supercritical state fluid or near-supercritical state fluid is about 176 bar to about 440 bar.

22. The method according to Claim 18, wherein exposing the workpiece to the mixture comprises applying the mixture on the workpiece at a flow rate of about 0.1 liter per minute to about 25 liters per minute.

23. The method according to Claim 18, wherein the oxidizing agent comprises N_2O, NO_2, N_2O_2, or combinations thereof, and wherein the layer of oxide comprises nitrogen doped oxide.

24. The method according to Claim 18, wherein the workpiece includes surface contaminations on a surface thereof, wherein the surface contaminations are removed simultaneously with the forming of the oxide layer.

25. The method according to Claim 18, wherein the workpiece includes a material layer formed thereon, wherein forming the layer of oxide comprises forming the layer of oxide on the material layer.

26. The method according to Claim 25, wherein forming the layer of oxide comprises forming a capacitor dielectric layer on the material layer.

27. The method according to Claim 26, wherein the material layer comprises a bottom capacitor plate of a metal-insulator-metal (MIM) capacitor, further comprising forming a top capacitor plate over the capacitor dielectric layer.

28. The method according to Claim 18, wherein forming the layer of oxide comprises forming a gate oxide layer.

29. The method according to Claim 28, further comprising:

depositing a gate contact layer over the gate oxide layer;

patterning the gate contact layer and gate oxide layer; and

doping portions of the workpiece to form source and drain regions in the workpiece, forming a transistor device comprising the source and drain regions, gate oxide layer, and gate contact layer.

30. The method according to Claim 18, wherein forming the layer of oxide comprises forming the layer of oxide at a rate of about 5 Angstroms per minute or greater.

31. The method according to Claim 18, wherein forming the layer of oxide comprises forming about 400 to about 800 nm of material.

32. A method of forming an oxide layer, the method comprising:

providing a workpiece, the workpiece having a surface;

combining water in a supercritical state with an oxidizing agent; and

exposing the workpiece to the combined supercritical water and oxidizing agent, forming an oxide layer on the surface of the workpiece.

33. The method according to Claim 32, wherein the oxidizing agent comprises O_2, O_3, H_2O_2, NO, N_2O, NO_2, N_2O_2, organic alcohol, organic acid, organic aldehyde or combinations thereof.

34. The method according to Claim 32, wherein the workpiece comprises Si, Ge, SiGe, GaAs, InAs, InP, Si/Si, Si/SiGe, or a silicon-on-insulator substrate.

35. The method according to Claim 32, wherein the workpiece surface includes a material layer formed thereon, wherein forming the oxide layer comprises forming the oxide layer on the material layer.